Soil Conservation

February 1980

U.S. Department of Agriculture

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From the Administrator

Well-Qualified Beginners in Conservation

A little over 2 years ago, with no fanfare, the Soil Conservation Service assumed an important, nationwide responsibility to rate and certify professional conservationists at entry grade levels.

SCS took over this task at the request of the Office of Personnel Management (OPM) in September 1977, due to a growing awareness that SCS possessed the requisite expertise to carry out this national responsibility and was in the best position to determine the qualifications of potential employees.

The Special Examining Unit (SEU) set up in the National Office to carry out this duty has since racked up a steady, enviable record of accomplishments. The largest unit of its kind outside OPM, it has become a model for other agencies.

New procedures and additional rating criteria were established for soil conservationists, soil scientists, and range conservationists at the entry grade levels. The added criteria reflect the knowledge, skills, and ability required for these positions and place emphasis on the broadest academic background in plant, soil, water, and animal sciences.

The SEU has trained as raters approximately 200 conservation professionals located throughout the Nation.

Some 9,200 well-qualified individuals had been referred to employing officials in SCS and the Forest Service and in the Bureau of Land Management, U.S. Department of the Interior—the major users of the service—by the end of fiscal year 1979; and a total of 1,549 individuals had been selected for positions.

Registers are computerized, making them more quickly accessible.

Selecting officials are notified when registers get low, so that they can accelerate recruiting activities.

Conservation districts benefit when SCS and other agencies can meet staffing needs better and faster. Districts also can benefit more directly, by requesting referral lists of eligible applicants to meet their own staffing needs.

The young people who are eager to begin a conservation career obviously benefit from the streamlined system, too.

We look forward to even greater accomplishments and assistance from the SEU as it continues its third year of operations. We fully expect it to make significant contributions to coping with the many, diverse conservation challenges that SCS and districts together face in the "Action Eighties."

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Soil Conservation

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Cover:
While watching the 1980 Winter Olympics in Lake Placid, N.Y., this month, few people will think of the conservation measures that were needed on the snow-covered hills. (See article beginning on page 4. Front cover photo courtesy of the Lake Placid Olympic Organizing Committee.)

Erosion Control for the Olympics

Protecting the Soil in a Harsh Environment

At the base of the 1980 Winter Olympics—to be held in Lake Placid, N.Y., this month—is over 700 million years of geologic history. The ancient Adirondack Mountains in which this small, resort community is nestled have weathered glaciers, blizzards, subzero temperatures, and the varied activities of man, including the 1932 Winter Olympic Games, also held in Lake Placid.

The climate of the mountains is harsh—harsh on life and on the elements that support life. One of these elements is the soil: a vital yet easily destroyed resource in the Adirondacks. It has taken 10,000 years, since the last glacier swept the mountains bare, to build a 6-inch layer of topsoil. One pass of a bulldozer can wipe out 10,000 years of nature's work in seconds.

In preventing environmental hazards posed by preparations for the 1980 Olympic Games, the Soil Conservation Service has played an important role. The combination of the soil limitations, the harsh climate, and earth moving to meet the exacting demands of Olympic facilities created erosion and stabilization problems that called for SCS' expertise.

The agency first became involved in 1975, when SCS District Conservationist Donald Wild began attending meetings of the Environmental Advisory Task Force. The meetings were open to the public and the press, and included reports by the general contractor for Olympic construction and the New York State Departments of Health and Transportation, among others. As a result of these meetings, Wild was invited to serve as SCS representative on the Federal-State Joint Agency Committee, a group comprised of the various agencies involved in the planning and construction of facilities for the Olympic Games. The committee met every 2 weeks, and advised on many phases of Olympic planning and construction: everything from progress on the new fieldhouse to dealing with trash disposal during the games.

Providing Soil Information and Planning Parking Facilities

Wild's work on the committee and the resulting contacts led to requests for SCS assistance and advice. One of the first requests was for a soil survey. Soil information was particularly vital in planning for the Olympics not only because of the harsh Adirondack climate, but also because the soils in the area could be easily destroyed if proper safeguards were not taken on construction sites. The tight construction schedule and uncertain Adirondack weather added urgency to the planning effort.

At the request of the Lake Placid Olympic Organizing Committee (LPOOC), a six-person SCS soil survey party began work in 1975 to map 45,000 acres. The survey party completed the mapping and presented the soil survey to the LPOOC in 1978.

The information in the soil survey was especially useful in planning parking facilities for the tens of thousands of vehicles that will be used by athletes, spectators, workers, and vendors for the games. During the games, no private vehicles, except residents', will be permitted in Lake Placid. Visitor parking will be provided in 10 peripheral parking

The harsh climate, soil limitations, and earth moving for the Olympic facilities combined to create erosion problems as shown on the hill for the 70- and 90-meter ski jumps. SCS recommended several measures such as conservation plantings and tile drainage to control the erosion.

by Karen Rusinski

lots located in towns close to Lake Placid. Buses will transport visitors to and within the village. The challenge was to prevent the entire area surrounding Lake Placid from becoming one giant parking lot.

Each lot will be "reclaimed" after the games, or returned to its pre-Olympic use—in one case, a high school athletic field; in another, a private campground. Based on soil information, Don Wild provided the LPOOC with recommendations on laying a durable surface for the parking lots, yet one that could be quickly reclaimed afterwards. Recommendations included the amounts and depths of topsoil needed on top of the gravel, sawdust, and wood chips used in each lot, and grass seedings that will quickly establish themselves after the games.

Stopping the Sliding Olympic Village Site

The soils presented another challenge during construction of the Olympic Village, which will house about 2,600 athletes during the competition. The village site is bordered on two sides by steep hills and on a third by Ray Brook, a trout stream. After the site was cleared for construction in 1977, a combination of equipment traffic, an unusually wet fall, and soil limitations overloaded the contractor's erosion and sediment control measures. These included debris basins—which allowed sediment from runoff to settle before the runoff entered the stream—filter paper over the basin outlets, and hay bale diversions.

Time was the problem in controlling the erosion. It was already October, and the site had to be stabilized before winter—which can come early in the Adirondacks. The erosion problems were worsening rapidly, with increasing amounts of sediment from the bordering hillsides and the cleared site itself ending up in Ray Brook. "The whole thing just started moving," recalls Jim Hill, a former SCS engineer now with the Adirondack Park Agency as a soil and water specialist.

When Hill called Wild, 2 inches of sediment had already been deposited in Ray Brook. Wild contacted SCS Area Engineer Dana Chapman in Albany and SCS Conservation Agronomist Bob Crawford in the SCS State office in Syracuse. They evaluated the problems and made recommendations immediately so the problems could be corrected in a matter of days.

The contractor accepted the recommendations and immediately modified the debris basins to provide for a longer retention time to allow sediment to settle out before the water was outletted into the stream. Coarser filter paper was installed on the basin outlets and 3 to 4 inches of wood chips were laid down on critically eroding areas.

The hillside location of the Olympic Village called for more permanent erosion control measures as well. SCS recommended the installation of vegetative bench terraces on one slope to catch runoff. Rock gutters and diversions were installed on the other sides to safely divert water around the site. Conservation seedings of redtop, perennial ryegrass, tall fescue, birdsfoot trefoil, and medium red clover were planted on slopes and stabilized with jute netting.

According to Don Wild, these measures have worked. The plantings are now well established and Ray Brook

When erosion and sediment control measures became overloaded during construction of the Olympic Village, more than 2 inches of sediment was deposited in Ray Brook, a trout stream. SCS was called in to evaluate the problems and recommend solutions.

To help control erosion, SCS recommended that vegetative bench terraces (top photo) be installed on a hillside sloping into the athletes' housing site. Rock gutters and diversions (bottom photo) were installed to divert water safely around the site.

once again runs clear, although some sediment is still visible on the streambed.

Keeping the Jumps Up

One of SCS' most important areas of involvement was with the 70- and 90-meter ski jumps. The 90-meter jump towers 266 feet above the top of a hill just south of Lake Placid. The 70-meter jump is a few feet beside and below it on the same hill. During the games, skiers will hurtle down from the tops of these structures and attempt to land as far as possible down the hill. From the bottom of the hill to the top of the 90-meter jump is 466 feet—almost one and two-thirds the length of a football field.

The slope of the hill had to be built to a precise and constant angle of 38° because slope determines a skier's distance. After construction and grading with machinery, the grade was leveled using hand tools and a string grade line. The slope was then planted to stabilize it.

However, the following spring problems became apparent. The local glacial soil material used in building the hill began to slip from the middle of the slope towards the bottom, destroying the precise 38° slope. The problem was that the soils had to be placed at an angle steeper than their natural angle of repose.

In addition, an access road on the original contour of the hill had been buried during construction. Water draining down the original hill contour was blocked by the old road and forced out onto the fill soil placed to form the new slope. As it ran down the new slope, it began to erode the newly placed soil, worsening an already bad situation.

Again Don Wild was consulted. He suggested replacing part of the sandy, loose soil with topsoil to provide a better base for seedings, and installing a tile drainage system at the middle part of the slope where water was draining out from the old road. He also recommended conservation plantings such as redtop, creeping red fescue, perennial ryegrass, and birdsfoot trefoil for hard-to-stabilize areas of the slope itself. A thicker hay mulch was also applied to hold the plantings in place while they germinated.

The plantings have become well established in the newly laid topsoil, and the drainage system is working. The slope is now ready for the Olympics.

Stabilizing the Fieldhouse and Other Sites

Slope stabilization was also a problem at the site of the new fieldhouse. The arena from the 1932 Olympics was not large enough for the expanded 1980 games, so a new 8,500-seat fieldhouse was constructed beside it on the hillside. After construction was completed, the architects requested SCS' recommendations on how to best stabilize the slope behind the new structure. The area had already been graded and bench terraces installed. Don Wild recommended regrading and seeding with perennial ryegrass, creeping red fescue, tall fescue, redtop, and Kentucky bluegrass. Since the architects wanted some sort of woody plants on the slope for esthetic reasons, Wild also recommended shrubs such as bristly locust, highbush cranberry, silky dogwood, and juniper to be planted after the grasses had become well established.

SCS assisted on other Olympic sites. For the new cross-country ski trails on Mt. Van Hoevenberg south of the village, SCS recommended 'Lathco' flatpea, which is a durable plant and holds snow cover well. Topsoil depth recommendations were made for the bobsled run, also on Mt. Van Hoevenberg, which was totally reconstructed from the 1932 course. The original wooden run was replaced with refrigerated concrete.

What happens to all of these facilities after the Olympics? Plans are to use them as a permanent winter sports training facility operated by the State of New York. The cross-country ski trails and the bobsled and luge runs on Mt. Van Hoevenberg will be operated as a recreation area open to the public.

Now everything is ready for the show. When the Olympic flame is lighted high over the snow-covered land, few will give any thought to the soil beneath it. Thanks to those agencies charged with protecting the soil and its environment, such as the Soil Conservation Service, they won't have to.

Ms. Rusinski is visual information specialist, SCS, Syracuse, N.Y.

Following SCS recommendations, part of the loose soil was replaced with topsoil on the landing hill for the 70- and 90-meter ski jumps to provide a better base on which to establish conservation plantings. The plantings included redtop, creeping red fescue, perennial ryegrass, and birdsfoot trefoil.

The Johnny Appleseed of Windbreaks

In Holt County, Nebr., windbreak trees have been ripped out by the thousands in order to make room for center pivot irrigation farming. One man, though, has waged his own personal battle for the trees.

During his 72 years in the area, Claude Liermann has planted about 55 acres or more than 56,000 trees. "What this country needs is more trees," said Liermann of the sandy rangeland.

Prior to retiring 4 years ago, Liermann ran an 800-head cow-calf operation on his 3,300 acres. He added, "I've always believed in trees, and began planting them back in 1928 when I first started ranching. I saw how the other ranchers were using windbreaks established by the homesteaders and were keeping their cattle behind the big groves for protection.

"Years ago we used to build sheds to protect the cattle. But today you couldn't have enough sheds to cover the size of some of these herds. The trees are good protection for the cattle, and that protection means extra weight at market time."

The windbreaks have also provided shelter to wildlife. Liermann added, "I was about 20 years old before I ever saw deer running around here. Now with more trees throughout the county, we see deer, pheasants, and quail."

"Claude Liermann has always been conservation minded," said Bob Lowe, district conservationist for the Soil Conservation Service in Holt County. "His file of conservation work is about as thick as a Sears and Roebuck catalog."

In the late sixties, Liermann was cited twice by the Nebraska Centennial Commission. One award was given to him for his tree planting efforts and another for excellent grassland and rangeland management practices.

Liermann remarked, "A person is always learning. In one of my first windbreaks I had a good Chinese elm grove. Then one year we got an early winter snowstorm and it wiped out the entire center of the grove. I haven't planted any Chinese elm since.

"Another time I planted some boxelder trees in a windbreak near the house. If you look around here," said Liermann glancing around the room, "you might be able to see some boxelder bugs. I just can't seem to keep them out of the house.

"Since then I've planted cottonwoods, redcedar, and ponderosa, Austrian, and jack pines. But the redcedar is my favorite because it gives the most protection—its branches are thicker and its needles are closer together."

SCS has provided assistance to Liermann in designing the windbreaks, selecting tree species, staking out spacing, and other techniques for insuring the trees' survival.

Liermann explains how he handles the delicate seedlings. "A key to the survival of the seedlings is to take care

When spring arrives, Claude Liermann is quick to get out and check the trees he has planted for windbreaks. He says that it is important, especially during the first 3 years, to plant new seedlings for any trees that have died.

by Patrick B. McGrane

of them when they first arrive at the ranch. You can't leave them in the shipping boxes. To keep the roots from drying out, you should 'shoe-in' or bury the roots until ready for planting.

"When it's time to plant them, we're always careful to carry the seedlings with the roots in a bucket of water. Otherwise, on a hot, windy day, the air hitting the roots can kill them in a very short time.

"We use a plow to throw the soil so that it will provide a barrier against the wind and protect the new seedlings. Using a shovel, we plant the seedlings as close to the thrown soil as possible."

Liermann added, "After the initial planting, the next 3 years are critical for checking the trees and replanting any that have died. Many people don't, and, as a result, you can see windbreaks with holes where trees have died. These windbreaks would have been more effective if the dead trees had been replaced. If you don't replant early, the surviving trees will have grown too large for the new seedlings to catch up.

"Spring tree planting has always been a regular event on our ranch. We have planted trees every year since 1949, and always plant at least 200 trees. This year we're planting 3,000. I'm going to take my time planting them though—I'm getting kind of 'antiqued' now, and can't manage those long days anymore.

"But I know that as long as I'm able, I'll continue to plant trees," declared the "Johnny Appleseed" of Holt County.

Mr. McGrane is public information officer, SCS, Lincoln, Nebr.

Cows and calves find protection from the wind behind windbreaks planted by Liermann. The windbreaks also provide shelter to wildlife.

Even a young windbreak can trap snow. As the years go by, this windbreak will supplement the existing windbreaks on the Liermann ranch and provide continued protection.

The Greening of Oklahoma

by F. Dwain Phillips

Oklahomans are showing a new interest in an old conservation practice—windbreaks. Innovations in the design and kind of trees used, introduction of the drip irrigation system, and an intensive information campaign have revived this interest.

During the 1930's and 1940's, more than 2,000 miles of windbreaks were planted in Oklahoma. This was one of the first conservation practices applied to the land to reduce wind erosion. Interest in windbreak plantings declined, however, in the sixties and early seventies for three reasons: (1) Limited rainfall in the western part of the State was killing many of the tree seedlings; (2) the mature trees were robbing crops of precious moisture; and (3) the older windbreaks consisted of 10 to 15 rows of trees, which took valuable land out of production.

In 1977, Leonard Solomon, executive director of the Oklahoma Conservation Commission, working with the Soil Conservation Service, called together a group of State and Federal agencies and public organizations to discuss ways to encourage windbreak plantings.

Agency representatives formed a committee to carry out an information campaign to promote windbreaks. The committee included representatives from the Oklahoma Conservation Commission, the Oklahoma Departments of Wildlife and Agriculture, Oklahoma State University Cooperative Extension Service, Oklahoma Wildlife Federation, and the U.S. Department of Agriculture's Agricultural Stabilization and Conservation Service (ASCS) and SCS.

These agencies conducted the campaign using press releases, feature articles, television programs, and pamphlets and brochures. The campaign pointed out that windbreaks with 2 or 3 rows of trees are just as effective as the older ones with 10 or 15 rows. It recommended the use of such trees as pine, cedar, arborvitae, and autumn olive which don't sap as much moisture from adjoining cropland as some species that were used in the past. Also, the evergreens provide more year-round protection from the wind.

In the campaign the agencies emphasized the following benefits of planting windbreaks:

- Reducing wind erosion;
- Protecting livestock from the wind;
- Trapping snow;
- Providing cover and food for wildlife; and
- Saving energy when planted around farmsteads by reducing utility bills.

In response to the critical problem of watering the trees, the agencies recommended using drip irrigation systems to establish windbreaks. The trickle or drip irrigation system distributes water through plastic lines. An opening, or emitter, is located at each plant so that water is not wasted in the area between the plants.

Usually drip systems are used for the first few critical years of a windbreak's growth to establish the seedlings. The first drip systems used in Oklahoma windbreaks were installed in 1978 in 18 windbreaks. Survival of these trees was 95 to 99 percent. The average survival rate for tree seedlings not watered by a drip system is 40 to 50 percent.

Landowners in western Oklahoma had tried for years to keep the seedlings alive, but water scarcity, sandy soil, and hot, dry summer winds often made it impossible. They now feel they have the answer with the drip irrigation system.

Conservation districts, SCS field personnel, and State foresters have been providing technical assistance in selecting the location of the windbreaks and the tree species, proposing the amount of spacing between trees, providing soil information, and designing the drip irrigation systems.

Cost-sharing assistance on windbreaks and drip systems is provided through the Great Plains Conservation Program, administered by SCS in 30 western counties of the State, and through the Agricultural Conservation Program, administered by ASCS.

The campaign has already had an effect. In 1978, 275 windbreaks were planted in the State—only 31 had been planted the year before. And in 1979, 508 windbreaks were planted and 136 drip irrigation systems installed.

Oklahoma farmers and ranchers are catching on to a winning combination: improved windbreaks and water-efficient drip irrigation systems.

Mr. Phillips is public information officer, SCS, Stillwater, Okla.

Native Plants Used in Landscaping Watershed Lake

by David G. Thompson

Building a floodwater retarding dam is always a complex effort, but building one on property listed in the National Register of Historic Places further complicates the effort.

Blue Hawk Peak Ranch—commonly known as the Pawnee Bill Museum and Mansion—in Pawnee County, Okla., was the home of Gordon William Lillie, who once traveled with the Buffalo Bill Wild West Show and later formed his own show known as the Pawnee Bill Wild West Show. The mansion, which Lillie and his wife built in 1910, sits atop a hill and overlooks the surrounding countryside, including about 2,000 acres Lillie acquired to raise what was then the largest privately owned buffalo herd. The ranch is located within the Lower Black Bear Creek watershed and the Pawnee County Conservation District.

Because of the mansion's vantage point, any floodwater retarding dam built in the area would be highly visible. Thus, special considerations were required when the planning began for constructing a dam in a valley below the mansion.

A planning team made up primarily of specialists from the Soil Conservation Service developed alternative landscape designs. After reviewing the designs with the Oklahoma Department of Tourism and Recreation, the planning team worked with the Advisory Council on Historic Preservation to be certain that the dam would be compatible with the surrounding landscape. The planning team realized that site location and construction techniques alone would not solve the visual impact problems; the structure would still dominate the landscape.

The team decided to use native plant materials to contrast with the dam's geometric form and to screen objectionable views. This decision, however, presented another problem: The needed plant materials would take several years to grow to the size required in order to be effective. In addition, a large enough supply of the native species was not available.

To solve the problem, the planning team decided to transplant native species from a wooded area which would be cleared for construction of the dam. Assisting the conservation district and the Black Bear Conservancy District, Loran Zweiacker, SCS district conservationist; Norman Smola, SCS forester; Toby Moss, SCS environmental specialist; and I met on the site and selected 50 trees to be transplanted to locations around the site. The trees included hackberry, elm, redbud, ash, pecan, oak, persimmon, mulberry, and wild plum.

Because the trees were to be moved after they had lost their leaves, making identification more difficult, they were marked with flags of various color combinations to aid in identification during the move. Trees with trunk diameters greater than 1 1/2 inches were not selected because their large root systems could be damaged during the move; with minimal root damage, the trees would have a better chance for vigorous growth the following spring.

A planting plan was prepared showing specific locations for each tree based on color, growth, form, and other characteristics. A tree spade and operators were leased from the State Forestry Division for the relocation.

In order to move the trees in their dormant stage, transplanting took place in December 1978. After being transplanted, each tree was generously watered to fill air spaces and provide a good seal between the tree's root ball and its new surrounding soil.

Loran Zweiacker, SCS district conservationist, checks the condition of one of the transplanted trees.

By late fall 1979, only one tree had failed to survive. Its loss was due to damage by rabbits.

Clearing operations for construction will be carefully controlled to preserve as much existing vegetation as possible, and the earth will be shaped and smoothed so construction areas blend with the surrounding landscape. To further minimize the earthen dam's visual impact, it will be seeded, along with other areas requiring vegetation, with native grass seed.

Mr. Thompson is landscape architect, SCS, Stillwater, Okla.

Johnson Creek Revisited

This article is a followup to articles which appeared in the July 1956, January 1961, and June 1965 issues of *Soil Conservation* magazine.

by Frank Richardson
and James Bilyeu

Farmers in the Johnson Creek watershed in western Tennessee like to reminisce about how they banded together 25 years ago to make their lives a little better.

During the midfifties, the upper end of the Johnson Creek watershed in Madison County was pockmarked with 1,650 acres of raw, eroding gullies. Tons of stream-polluting sediment washed from these gullies with each rain. Once-productive bottom lands were being buried under layers of sterile sediment, and streams were filling up. In some areas of the flood plain, sediment deposition amounted to as much as a foot, and one tributary of Johnson Creek had been choked with nearly 4 feet of sediment.

Soil Conservation Service personnel had convinced the farmers that reclamation of the gullied land was technologically possible, but the landowners were not financially able to undertake such an ambitious effort. However, the landowners discovered that through the then-new Public Law 566—the Watershed Protection and Flood Prevention Act—the needed land treatment was within reach. They applied to the Madison County Soil Conservation District and SCS for assistance.

In another effort to stabilize the gullied land, the district conducted an educational program to persuade the farmers to sign up for financial assistance for tree planting under the Agricultural Conservation Program (ACP). The district borrowed money, interest free, from the local Production Credit Association to buy pine seedlings to distribute to the farmers. As soon as the trees were planted, the district paid the participating farmers the balance of the ACP payment.

Not only did the tree planting program provide money during the winter months when money was usually in short supply, but it also taught the farmers how to participate in the ACP and created a desire to treat gullied areas. Another benefit that resulted was a fire protection program in the area which was established by the Tennessee Division of Forestry in cooperation with USDA's Forest Service and SCS.

Now, 25 years after the farmers set the first seedlings into place, their labors are bearing fruit. The trees average 10 inches in diameter, producing more than two cords of pulpwood per acre annually, and have produced enough soil-protecting litter to cover the new forest floor to a depth of 4 to 6 inches. The 1,650 acres of gullies have been stabilized.

The Johnson Creek Watershed Program itself was completed in 1965. The five flood control structures, 5 miles of channel improvement, and other technical assistance for land treatment have virtually eliminated flooding. Critically

Twenty-five years ago even small rains overloaded Johnson Creek and sent floodwaters (left) and sediment (right) spreading over the bottom land.

eroding areas were treated with sericea lespedeza, bermudagrass, kudzu, and minor structural measures. Cropland, pasture, and other lands were also successfully treated under the watershed land treatment program.

In the old days, a 3- to 4-inch rainfall would have meant extensive flooding, scouring of topsoil, and deposition of sediment along the creek. But between May 9 and 13, 1975, a total of 6 inches of rainfall failed to cause any flooding.

Several farmers who participated in the watershed program were asked their opinions of the effectiveness of the program. They remembered the risk in crop loss they faced each year in farming the bottom lands. They remembered the years before the floodwater retarding dams were built and the new forests were planted.

During the late spring of 1978, Z. B. Bass, who operates a family farm in the upper end of the watershed, said, "It has been raining here for 3 days. If it hadn't been for our watershed project, all of our crops in the bottom would have been washed away or at least covered with sediment."

Now the same bottom land fields can be cropped each year with little risk of loss or damages from floods.

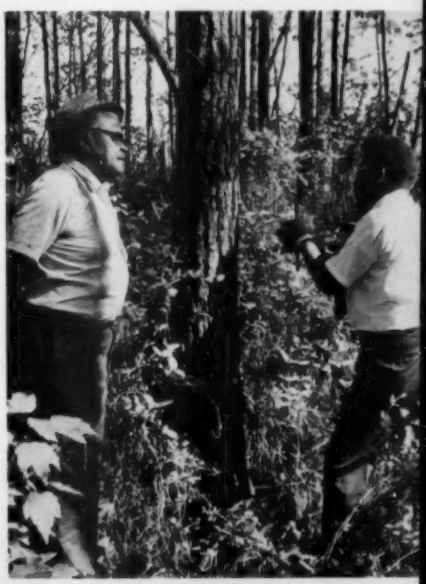
Larnell DeBerry, who operates a cotton and soybean farm near the center of the watershed, thinks that local farmers will continue practicing conservation farming even though the project has been completed: "I believe the things we learned about conserving our soil, growing better crops, and working together during project installation will serve to remind us and the generations to come of our responsibility as stewards of the soil. Continued conservation is our aim."

Another Johnson Creek watershed farmer said, "We now know that when a pine seedling is planted in a gully, we can expect numerous benefits. We have seen the results."

The people of the watershed still share a feeling of fraternity and accomplishment. Their incomes have increased, they have built new homes, their roads have been improved, and they have established recreational facilities.

A return visit to the Johnson Creek watershed shows that the flood control project and other conservation work completed many years ago is still doing its job, making the watershed a safer, more beautiful place in which to live.

Mr. Richardson is land treatment specialist, South Technical Service Center, SCS, Fort Worth, Tex.
Mr. Bilyeu is public information officer, SCS, Nashville, Tenn.



At left, in an effort to stabilize gullies in the watershed, landowners planted thousands of pine seedlings. At right, as SCS Land Treatment Specialist Frank Richardson (right) checks the growth of the trees 25 years after they were planted, local farmer Larnell DeBerry discusses the improvements they have both seen in the watershed over the years.

An Exercise in Optimism

by Shirley Foster Fields

Laurence Van Voorhies is 75 years old. He is a man with a passion for life that is four-dimensional—his grandchildren, other people, conservation, and trees.

His interest in conservation and trees began in 1967 when he purchased 240 acres of woodland a few miles from his home in Seymour, Ind. Three years later, Van Voorhies retired after a 42-year career in retail merchandising. Today, he is a man in constant motion, demonstrating that forestry is no casual, slapdash pastime, but a highly sophisticated, time-consuming, and rewarding art.

Van Voorhies recalls his long career in merchandising with pleasure. As manager of a variety store in Seymour, he supervised 160 employees and every facet of the retail buying and selling operation. "The work was stimulating," he said, "with new items always coming in and old items disappearing. I was always ready to go to work in the morning, and sometimes I hated to leave at night. But what did I know about trees or woodland conservation then? Absolutely nothing.

"One spring day when I had retirement on my mind, my wife and I took a drive a short distance beyond town. We stopped on a hill to look down on a valley of dogwood trees. Although I had always admired that valley, I never dreamed I'd own it one day. But, not long after that, I bought that 240 acres of woodland. And it's the best move I ever made."

For Van Voorhies it's been a nonstop love affair with woodlands ever since. He continuously thinks trees. He especially thinks about the future of trees.

Van Voorhies will tell you that Indiana has 3.8 million acres of forest land, and private owners control 85 percent of that acreage. In 1970, the timber harvest was 351 million board feet, a 40-percent increase over 1949. But, he adds, while these figures look fine on paper, they mask another not-so-cheerful story.

Like almost every State in the Nation, Indiana is losing forest acreage every year to cropland and pastureland as well as to highways, housing, and other forms of urban development. But while our forest lands shrink, the demand for lumber and forest recreation facilities swells.

The goal of soil conservation, Van

As part of his comprehensive woodland conservation plan, Laurence Van Voorhies has cleared and maintained 3 miles of fire lanes in his 240-acre woodland. He has also constructed a 6-acre farm pond to provide fire protection.

Voorhies pointed out, is to: "Use every acre according to its capability, and treat every acre according to its need." First and foremost in southern Indiana, this means: don't denude hilly land of trees.

A few months after he bought his woodlands, he contacted the Jennings County Soil and Water Conservation District for assistance in his new venture. With help from the Soil Conservation Service district conservationist, he developed a long-range, comprehensive woodland conservation plan for his land. The plan is the foundation for every work project that has followed.

Van Voorhies' early interest in forestry was enhanced by serving 2 years as chairperson of the Historic Hoosier Hills Resource Conservation and Development (HHHRC&D) Woodland Committee. He is a charter member and former president of the Indiana Forestry and Woodland Owners Association, Inc., a nonprofit, statewide group of private landowners dedicated to "the total forest resource." In 1973, he was first-prize winner ($500) of the annual Tom Wallace farm forestry awards competition, sponsored by the *Courier-Journal* and *Louisville Times* newspapers to honor top farm foresters in Kentucky and southern Indiana. He donated the $500 to the HHHRC&D Woodland Committee in addition to his Agricultural Conservation Program cost share for completing 83 acres of timber stand improvement. In 1975, Van Voorhies was named Indiana Tree Farmer of the Year by the Indiana Hardwood Lumberman's Association, and he competed for National Tree Farmer of the Year. In 1977, the Hoosier Chapter of the Soil Conservation Society of America honored him for his "outstanding contribution to natural resource management."

With his wife, son and daughter-in-law, and six grandchildren, who are truly fellow conservationists, Van Voorhies has removed vines, brush, and cull trees from his woodlands. He has cleared and maintained 3 miles of fire lanes, constructed a 6-acre farm pond, improved wildlife habitat, and planted more than 17,000 trees.

Indiana is the heart of America's hardwood country. In Van Voorhies' woodlands, the trees are a splendid tapestry, a mingling of conifers and deciduous trees of varying heights, textures, and colors. Although he believes in harvesting trees when they are mature, there are a few towering oak and yellow-poplar trees on his property which he says he will never cut. He hopes that future generations will appreciate their majestic size and beauty. To the century-old stands, he has added 5,000 yellow-poplars, 3,100 walnuts, and 2,200 white pines, all commercially valuable trees.

Since the first cutting in 1972, Van Voorhies has sold 140,000 board feet of timber. Money from the timber sales helped cover the cost of building a cabin in the woods to accommodate his family and the people who come to observe his work.

"Multiple use" and "renewable resource" are common terms among professional foresters, and they apply very well to Van Voorhies' land. His dogwoods, like his giant oaks and yellow-poplars, are cherished for their beauty. His farm pond is for swimming, ice skating, boating, fire protection, and wildlife. And his plantings of 'Cardinal' autumn olive shrubs provide food and cover for wildlife.

Van Voorhies' special pride are his two groves—8 acres in all—of 5-year-old walnut trees. Walnuts are valued the world over, not only for their nuts, but for their use in the manufacture of fine furniture and veneer for interior woodwork and paneling. The recent sale in Ohio of a single mature walnut tree—famed for its exceptionally beautiful grain—attracted bidders from Western Europe and Japan. The purchase price of this one tree was $30,000. That's much money, yes. But much time also went into the growing of the tree—an estimated 200 years.

A walnut tree is 10 to 15 years old before it bears many nuts, and at least 50 years old before it can be cut for quality timber. Many things can happen between the seedling stage and a mature, top-quality specimen. Soil, insects, weeds, rainfall, spacing, sunlight, and pruning are all important factors in cultivating the valuable tree.

Most critical of all is the soil in which walnuts grow. As the young trees age, their root systems must develop properly. Underlying layers of rock, heavy clay, or poorly drained soil will restrict their full development. For best growth, the trees should have at least 4 feet of loamy, well-drained soil with no restrictions.

The tools for checking the soil are a probe and an auger. Fortunately for Van Voorhies, the man with the tools and the expertise was nearby. SCS Soil Scientist Allan Nickell surveyed the woods, sampled the soil, and located the most suitable sites for planting the walnut trees. SCS District Conservationists Robert Martin and Bob Steiner and Indiana State District Foresters Larry Owen and Joe Schuerman have supervised every other aspect of

woodland conservation on Van Voorhies' property.

Through the assistance he has received, Van Voorhies has learned that observation, patience, and finesse are essential to successful forestry.

European black alder trees play a unique role in Van Voorhies' walnut groves. One hundred are interspersed among his walnut trees in a deliberate mixed planting of the two species. Why? The black alder is a nitrogen-fixing tree, and thereby enriches the soil. But even more important is its role as a "trainer tree." Black alders grow faster than walnuts. When the two species compete for light, the straight-growing alder forces the walnut trees to grow straight also, thereby immensely increasing the value of every walnut tree.

It is natural to ask Van Voorhies: "Why do you, at age 75, plant and prune and caringly minister to every need of 3,100 walnut trees that you will never see grow to maturity?"

There is nothing mysterious about this tall man from Indiana. He replies with a wink, "I will never see the full-grown trees. But my grandchildren will."

And therein lies the heart of the matter. There is something more valuable to him, perhaps, than even a tremendous dollar return on his walnut trees.

Like the forest itself, this "something more" is a treasure. It is a mixture of happenings and impressions, of richly textured memories. The remembering spans 12 years and centers upon six young people: Katie, Paul, Brian, Lisa, Pamela, and Kim. These are Van Voorhies' grandchildren.

"The children have learned to love the woods and all the creatures in it. They understand life's continuity. They know, too, that this isn't a throw-away world. Beauty is worth tending."

What does it mean to Van Voorhies himself? For him, the forest is an exercise in optimism.

Ms. Fields is a public information officer, Information Division, SCS, Washington, D.C.

Van Voorhies (left) and Gary Ross, former service forester with the Department of Natural Resources, survey growth of a mixed black walnut and poplar plantation. Van Voorhies planted autumn olive along field boundaries for wildlife.

Teamwork in Forest Reclamation

by Douglas D. Sorenson

A U.S. Army Reserve unit in Wisconsin is gaining a reputation for being conservation minded.

The 397th Engineer Battalion headquartered in Eau Claire, Wis., has accomplished thousands of dollars worth of conservation work while carrying out a training exercise. The engineers brought about 75 pieces of equipment and 300 men into a county and State forest to rehabilitate it after a fire raged through in spring of 1977.

The exercise, dubbed "Operation Pushover," was aimed at knocking down the burned tree snags to make way for machine tree planters. The idea began with the Golden Sands Resource Conservation and Development (RC&D) area in central Wisconsin where the Jackson County Forest and Black River State Forest are located.

A year after the fire, the RC&D forestry advisory committee observed that jack pine seeds were not germinating in the burned area. State and local foresters advised that new pines would not return naturally and would have to be machine planted.

Clearing the area for planting could be a costly part of the operation, and that's when the forestry group decided to get the army engineers involved.

"This was a beautiful opportunity for the men to learn how to use their equipment and at the same time do a job to benefit the public," said Lt. Col. David La Fontaine, commanding officer of the battalion.

In mid-August 1978, advance units staked out the work areas, moved in some equipment, and tested procedures. The planning was a real team effort for the army, Jackson County Forest Administrator Merlin Lambert, Wisconsin Department of Natural Resources Forester Robert Hess, and other county agencies.

On a September training weekend, the 397th Engineers moved in with eight bulldozers, eight front-end loaders, 35 dump trucks, several road graders, two draglines, and a few pieces of borrowed equipment. Several days later 200 of the 20,000 acres of burned forest had been prepared for tree planting.

The clearing required some experimentation by the engineers. The big trees were cleared easiest by bulldozing and windrowing. Smaller trees were rolled over and chopped on the ground. In the months following the fire, some of the usable timber had been salvaged.

Other conservation measures were given some military support while the army engineers were on hand. Five miles of fire lanes and access roads were widened and improved, and 1 1/2 miles of new roads were built. Two areas were cleared for ponds 100 feet in diameter and up to 15 feet deep that will provide water for emergencies and habitat for wildlife.

Recreation was given a boost from the engineers when they rebuilt three washed-out bridges on the snowmobile trails that crisscross the forest. The bridge timbers were sawed from the salvaged oak in the burned-over area.

Other salvaged timber will be cut into half logs to improve fish habitat in trout streams. This is an associated measure sponsored by the River Country RC&D area in west-central Wisconsin. Timber used by the reserves was sawed by the 457th Engineers army reserve sawmill unit in Hurley, Wis.

Both the military and the foresters are pleased with the good image that Operation Pushover presented to the public. It was a blend of ideas and cooperative effort among several government agencies.

Golden Sands RC&D Coordinator Robert Dawson said that this kind of project could be done in other areas, but he pointed out that the project has to be appropriate as a training exercise. "This project fit the army reserve engineers perfectly," he said. "Their heavy equipment was what we needed to get the job done. We could not expect an infantry or artillery group to take a job like this just to save some public money."

In the spring of 1979, 300,000 coniferous seedlings were planted on the areas prepared the previous fall by the reserve unit.

In the summer of 1979, a Wisconsin army national guard unit, the 264th Engineer Group, conducted training which resulted in the clearing of an additional 80 acres of burned-over forestland in preparation for new plantings.

Army engineer units are frequently asked to take civilian jobs to save public money. If the job is appropriate—and if it does not compete with private contractors—this can be an ideal cooperative arrangement to get conservation jobs done and at the same time provide valuable training for military units.

Mr. Sorenson is educational resource conservationist, River Country RC&D, SCS, Eau Claire, Wis.

More Than an Apple a Day

"Like everyone who works the land for a living, we are at the mercy of many unseen and unpredictable factors. Any one of them can mean the difference between profit or loss," said fruit grower Doug Yeary.

Yeary's interest in orchards goes back to his childhood when his father operated a small orchard near Cincinnati, Ohio.

In 1963, Yeary bought the 170-acre Muskingum County farm in east-central Ohio from Louis Abele. Abele had planted the first orchard there in 1937 and set a pattern for the land use that remains today.

"We started with what was there," said Yeary. "But we have replanted, rebuilt, or added new things almost every year to improve our efficiency and production."

By planting 500 to 1,200 fruit trees every year, the entire orchard has been replanted since 1963. The orchard is a family operation with Yeary, his wife Betty, and two children, Terry and Doug, doing most of the work. Extra people are hired to help with picking, bagging, and sorting fruit at harvesttime.

The main crop is apples. The Yeary family now has 90 acres of apples and 10 acres of peaches. "We are going to phase out the peaches because of the hard winters in Ohio in recent years. But we do plan to expand the operation to include plum trees, pear trees, nectarines, and raspberries," Yeary explained. "I also grow a little corn on the rest of the farm that is not in woods."

Fall is one of the busiest seasons for fruit grower Doug Yeary. Handpicking apples at harvesttime is only one of numerous activities the Yeary family is engaged in.

Two major problems for the Yearys' orchards are collar rot and deer damage. The soils on the farm are very heavy with high clay content. They hold a lot of moisture which causes the trees to rot near the ground.

"We are getting soil information now from the Soil Conservation Service. The SCS soil information helps us locate new trees on sites with better drainage and helps solve other drainage problems on the farm," said Yeary.

Deer ruined more than 600 trees in the Yearys' orchards last year. Replacement cost was about $1,800. "Rodents also damage some trees every year," Yeary added. "We spend hours and hours installing tree guards to keep rodents away from the tree base.

"In the spring and fall we really hustle around here," said Yeary. "The pressure is on. In the spring we begin our fertilization program. Spraying operations also begin early in the spring and continue throughout the summer. We usually spray about 20 times a year.

"A late frost can wipe out a whole year's crop, so frost protection is critical when the trees are in bloom," Yeary continued. "At one time we considered irrigation for frost protection. SCS helped us find a good pond site, surveyed the pond, and gave us an idea how much water the pond would hold—compared to what we would need to irrigate—and a cost estimate to build the pond. I used this information to select a frost protection system. I decided a wind machine was cheaper."

by Dale E. Goins

The wind machine circulates the air, drawing the warm air layer down. This warms the air temperature by 1 or 2 degrees which doesn't sound like much, but with the air movement, frost doesn't settle on the blooms. "It does the job for us," added Yeary.

During the summer months, the Yearys are busy with spraying and mowing. They also thin apples by hand to produce larger fruit. They attend meetings that provide information about new products and techniques. "Education is as continuous as the work in our business," said Betty Yeary.

In the fall their business starts for real: Fruit is picked, hauled from the field, washed, graded, bagged, and stored until it can be shipped to market. "Our storage problem was just about eliminated when we added a new refrigerator room that stores about 8,000 bushels," said Yeary.

"Our apples are graded by hand for quality, shape, and color," explained Betty. "Apples not meeting number one grades are used for cider."

The cider is made with a large hydraulic press that produces about 250 gallons of cider per hour. A jugger allows the Yearys to fill five 1-gallon jugs at the same time. Much of the cider is stored in a new freezer unit that holds 7,000 gallons.

In the winter, every tree must be pruned. Dead or unwanted limbs have to be removed for healthier trees. Ladders, machinery, and buildings are repaired and made ready for another season.

The Yearys are remodeling one room of an old barn built in 1815 for a retail salesroom. "We have added jellies, jams, and apple butter to diversify our sales," said Yeary.

The produce is shipped to the large market outlets in Columbus, Cleveland, and Cincinnati. "We also sell fruit through the American Fruit Growers Marketing Association," said Yeary.

Yeary's spare time is limited in the fall. The work begins at daylight. He manages the picking operations, the packing house, and retail selling. Cider making and the bagging of fruit are usually finished by 10 p.m. Yeary leaves the farm at midnight to deliver to the wholesale houses. "They usually accept deliveries at 4 a.m. This puts me back home at 8 the next morning, in time for breakfast and 3 or 4 hours of sleep before I start all over again," said Yeary. "My wife Betty helps manage the retail sales and bagging operations, or I couldn't make it.

"Our farm is now worth many times the purchase price and production has increased each year," continued Yeary. "We produced about 12,000 bushels of fruit this year. I would guess that our produce will provide over 70,000 families with fruit and cider.

"It may not be the easiest work, but it's our life and we enjoy it."

Mr. Goins is civil engineering technician, SCS, Coshocton, Ohio.

Frost protection is critical to a successful fruit growing business. Yeary asked the Soil Conservation Service for help when he was selecting a frost protection system. The wind machine, which circulates the air, proved to be the cheapest method for the Yearys.

A Winning Way

Teacher of the Year

Winner of the NACD–Allis-Chalmers Conservation Teacher of the Year award for 1979 is Jeannie Pratt, who teaches a gifted children's program for second through eighth grades at Whitebead Elementary School near Pauls Valley, Okla.

As the national winner, Pratt will receive a check for $1,000 and an expense-paid trip to the NACD annual conference at Houston, Tex. This makes two winners in a row for Oklahoma. Last year's Conservation Teacher of the Year was Terry Joe Shaw of Stillwater Middle School.

In developing her environmental education program, Pratt and her students bypassed formal textbooks. Students researched information on natural resources and planned their own projects with help from local resource specialists. Eventually, the entire school had a part in the program.

"We have no textbooks," Pratt said. "The world is our text. Perhaps all teachers should throw away their textbooks and depend on their own ingenuity and that of their students for ideas on which to build a program."

Pratt said that her environmental studies program covers all of the basic educational skills while reaching out to new activities that require observation, perception, research, and decision-making.

When the students investigated an open sewer and trash dump near the school site, their studies of soil, water quality, land use, and energy took on broader significance. Students took photographs, collected soil and water data, drew maps, and developed a plan to clean up the area so that they could extend their outdoor classroom projects.

The students then presented the results of their investigation and their plan for improving the situation to the school board. The board voted unanimously to approve the plan and the county commissioners supported the project.

The whole school joined in planting trees on the schoolyard and sprigging bermudagrass around a sewage lagoon. Plantings were also made to provide food and cover for wildlife. Pratt's third and fourth graders led students along a learning trail and explained different study sites.

Pratt's students also researched and made costumes for "Bird Talk," an operetta by the National Wildlife Federation, and presented it to the school. For an oral history segment on the Dust

Jeannie Pratt and three of her students check the growth of one of the conservation plants that students at Whitebead school planted. The plants will provide food and cover for wildlife and will screen the sewage lagoon shown in the background.

by Kay Mergen

Winning District

Bowl years in Oklahoma, one of Pratt's students interviewed her own grandmother for a firsthand account.

The multidisciplinary program at Whitebead resulted from a summer session that Pratt spent at East Central Oklahoma State University in environmental education classes. It was during the outdoor classroom studies that Pratt got the idea for extending learning opportunities for her gifted students through conservation.

As the environmental studies program developed at Whitebead school, Soil Conservation Service Soil Conservationist Paul May helped with the soil and water studies and provided other resource information. The Oklahoma State Forestry Division furnished technical help and seedlings for tree planting. The Garvin County Conservation District, which sponsored Pratt for the conservation education awards program, provided soil testing kits and signs for the outdoor classroom.

Runner-up for Conservation Teacher of the Year is Vendell Creed Tenney, science teacher at Buckhannon-Upshur Middle School in West Virginia, sponsored by Tygart Valley CD. His award is a $500 check.

Other regional Conservation Teacher of the Year winners include: Southeastern region, Ruby Birmingham, Gaston SWCD, Dallas, N.C.; Northern Plains region, Marcella Houser, Lower Platte North NRCD, David City, Nebr.; Southwestern region, Audrey Allmon, Delores SCD, Cortez, Colo; Pacific region, Norman Weitzel, Washoe-Storey CD, Reno, Nev.; and North Central region, Paula Doyle, Mahoning SWCD, Canfield, Ohio. Each regional winner receives a $200 award.

The Coconino Natural Resource Conservation District (NRCD) in Flagstaff, Ariz., has a winning way with conservation education. In 1977, Jim David, a teacher at Flagstaff Junior High, won the Conservation Teacher of the Year Award sponsored by the National Association of Conservation Districts (NACD) and Allis-Chalmers. In 1979, the Coconino NRCD took first place in the district competition of the NACD–Allis-Chalmers Environmental Conservation Education Awards Program.

"Jim David really got things started in the district with the pond project at Flagstaff Junior High," said David Parkman, environmental education coordinator for the NRCD. (See "Outdoor Study Center Rises from Mudflat," October 1977 *Soil Conservation*.) Since then local educators' interest in developing environmental education programs for all grades has boomed. To meet the increasing requests for assistance, the district hired Parkman in 1978 with funding through the Comprehensive Employment and Training Act of 1973.

With help from the district's education committee, Parkman evaluated environmental efforts already under way in the district, identified sources of learning materials available to schools, and established an environmental education library with district support.

To encourage schools in their efforts to develop environmental education programs, the members of a district conservation youth board sponsored a citywide Conservation Week. The youth board put together a 78-page booklet entitled "A Teacher's Resource Guide for Conservation Week." The booklet

Jim David and biology students evaluate pond microbiology at the Flagstaff Junior High School outdoor study site. David is credited with generating the interest in conservation education that eventually made the Coconino Natural Resource Conservation District a winner.

contained study guides for teachers of kindergarten through 12th grade to use with their classes in learning about conserving soil, water, air, wildlife, and human resources. The activities required students to use their math, science, writing, and other skills. The youth board also arranged for speakers to address school assemblies on environmental issues.

Jim Alam, Soil Conservation Service district conservationist at the Flagstaff field office, assisted the youth board with the project. Alam also provides technical assistance to district schools in developing their conservation education programs. When teachers need help with an outdoor study project, Alam makes sure they find the right resource person to provide it.

Other agencies and community groups that have provided assistance and support for the district's environmental education effort are USDA's Forest Service, the Arizona Game and Fish Department, the Youth Conservation Corps, Northern Arizona University, the Alpine Garden Club, and several community businesses. The Alpine Garden Club donated $500 and a lumber company donated wood chips for school site projects and learning trails.

The outdoor study area at Flagstaff Junior High is now used by students from all of the schools in the Flagstaff School District and by students from Northern Arizona University. Two elementary school sites in the city have developed outdoor classrooms for environmental studies, and adjoining school districts have become interested in developing an environmental education program.

Also as a result of the interest in outdoor studies generated by the Flagstaff Junior High project, the NRCD is currently working with the county parks and recreation department on developing a 20-acre environmental education and recreation facility. The district is now also involved in the planning of a 400-acre environmental study area set aside by the Forest Service.

"We try to fit the community resources to the needs of the schools and other groups interested in outdoor studies," said Parkman. Currently, the environmental education advisory committee—which is made up of community leaders, educators, and members of the Audubon Society and other conservation organizations—is helping implement a 5-year environmental education plan for county school districts.

During the first year, which is the stage they are working on now, the committee will develop conservation education curriculums for all grades in a form accessible to teachers. During the second year, the committee will concentrate on providing inservice teacher training. In the third year, it will assist in the development of outdoor classrooms at many schools in the county. In the fourth year, the committee will work on developing a countywide camp for grades 6 through 10. In the fifth year, the committee will concentrate on disseminating information on the progress of the district's environmental education program.

"The NRCD board of supervisors are dedicated to promoting conservation education," said Parkman. "They consider education one of their primary functions as a conservation organization. While they put special emphasis on environmental conservation education for young people, the board members are also dedicated to providing outdoor learning experiences for adults and the general community."

For placing first in the NACD–Allis-Chalmers Awards Program, the Coconino NRCD will receive a check for $1,000 and an expense-paid trip for a selected district leader to the NACD annual meeting in Houston, Tex.

Runner-up in the district competition is Morris County Soil Conservation District, Morristown, N.J. The district will receive a $500 check for its broad-based conservation education program under the direction of a full-time coordinator employed by the district.

Regional winners, who will receive $200 each, are: Southeastern region, Davie SWCD, Mocksville, N.C.; North Central region, St. Charles County SWCD, St. Charles, Mo.; South Central region, Crescent SWCD, Metairie, La.; Northern Plains region, Morton County SCD, Mandan, N. Dak.; and Pacific region, Topanga Canyon RCD, Topanga, Calif.

Ms. Mergen is head of educational relations, Information Division, SCS, Washington, D.C.

New Publications

Irrigation and Drainage in the Nineteen-Eighties

by the American Society of Civil Engineers

This is a collection of 54 papers and abstracts presented at the 1979 Irrigation and Drainage Division Specialty Conference held in Albuquerque, N. Mex., July 17–20, 1979.

The articles cover such topics as energy conservation, water quality and quantity, regional drainage prospects, research, and ground water law.

Photographs, tables, charts, graphs, maps, and diagrams accompany the articles, and a list of references follows.

The articles were published by the American Society of Civil Engineers, 345 East 47th Street, New York, N.Y. 10017. Single copies of the publication are $20.

Soil Surveys Published

Alabama: Cleburne County.
Colorado: Pueblo Area.
Georgia: Clayton, Fayette, and Henry Counties, and Lowndes County.
Indiana: Posey County.
Kentucky: Boyd and Greenup Counties.
Michigan: Ingham County.
Minnesota: Cottonwood County.
Mississippi: Itawamba County and Lowndes County.
Nevada: Carson City Area.
Oklahoma: Choctaw County.
South Dakota: Beadle County and Campbell County.
Texas: Jim Wells County.
Washington: Northferry Area.

Meetings:

February	
10–14	National Association of Conservation Districts Convention, Houston, Tex.
11–15	Society for Range Management, San Diego, Calif.
15–18	American Association of School Administrators, Anaheim, Calif.
20–23	Land Improvement Contractors of America, Phoenix, Ariz.
23–27	The Irrigation Association Technical Conference, Houston, Tex.
March	
9–14	The American Society of Photogrammetry, St. Louis, Mo.
16–18	American Pulpwood Association, New Orleans, La.
21–23	National Wildlife Federation, Miami, Fla.
22–26	North American Wildlife and Natural Resources, Miami Beach, Fla.
April	
2–3	Annual Symposium on Engineering Geology and Soils Engineering, Boise, Idaho
12–17	American Planning Association, San Francisco, Calif.
13–16	Association of American Geographers, Louisville, Ky.
14–18	American Geophysical Union, Washington, D.C.
15–17	International Symposium on Livestock Wastes, Amarillo, Tex.
16–18	Hardwood Plywood Manufacturers Association, Charleston, S.C.
27–29	Chamber of Commerce of the United States, Washington, D.C.
27–30	The Garden Club of America, Norfolk, Va.

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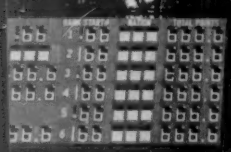
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